

What is claimed is:

1. A method for manufacturing a semiconductor device,
comprising:

an electrode forming step of forming projection
5 electrodes on a surface of a semiconductor substrate,

a step of forming a protective resin layer on a whole
region of the surface of the semiconductor substrate
provided with the projection electrodes,

a back side grinding step of thinning the
10 semiconductor substrate by polishing or grinding a back
side of the semiconductor substrate, and

a surface grinding step of exposing the projection
electrodes by polishing or grinding the surface side of
the semiconductor substrate.

- 15 2. A method for manufacturing a semiconductor device
as claimed in claim 1, in which

elements constituting a plurality of semiconductor
devices are formed on the semiconductor substrate, and

a plurality of groups of projection electrodes for
20 the plurality of the semiconductor devices are formed
in the electrode forming step,

the method further comprising a cutting out step of
cutting out pieces of semiconductor devices by cutting
the semiconductor substrate after completing the surface
25 grinding step and the back side grinding step.

3. A method for manufacturing a semiconductor device, comprising:

a step of forming a surface resin layer on a surface of a semiconductor substrate,

5 a step of forming a back side resin layer on a back side of the semiconductor substrate, and

a back side grinding step of thinning the semiconductor substrate by removing the back side resin layer, through polishing or grinding, from the
10 semiconductor substrate provided with the surface resin layer and the back side resin layer, and by further polishing or grinding the back side of the semiconductor substrate from which the back side resin layer has been removed.

15 4. A method for manufacturing a semiconductor device as claimed in claim 3, further comprising

a cutting out step of cutting out pieces of semiconductor devices by cutting the semiconductor substrate along cutting lines after completing the back
20 side grinding step.

SUB A, >
5. A method for manufacturing a semiconductor device as claimed in claim 3 or 4, further comprising

a step of forming projection electrodes on the surface of the semiconductor substrate before forming
25 the surface resin layer.

6. A method for manufacturing a semiconductor device
as claimed in claim 5, in which

the surface resin layer is formed in such a manner
that the projection electrodes are embedded in the
5 surface resin layer.

SUB A₂ > 7. A method for manufacturing a semiconductor device
as claimed in claim 5 or 6, further comprising

a surface grinding step of exposing the projection
electrodes from the surface resin layer by polishing
10 or grinding the surface resin layer.

8. A method for manufacturing a semiconductor device
as claimed in claim 7, in which the surface grinding step
is performed before the back side grinding step.

SUB A₃ > 9. A method for manufacturing a semiconductor device
as claimed in any of claims 3 to 8, in which the surface
resin layer and the back side resin layer are so formed
as to have substantially the same thicknesses
respectively.

10. A semiconductor device comprising
20 a solid device,
a semiconductor chip bonded onto a surface of the
solid device,
projection electrodes for external connection
formed on the surface of the solid device, and
25 a protective resin layer for sealing the surface

of the solid device with head portions of the projection electrodes thereon exposed.

11. A semiconductor device as claimed in claim 10, in which the solid device includes another semiconductor
5 chip.

SUB A₄ >
12. A semiconductor device as claimed in claim 10 or 11, in which the semiconductor chip is bonded face-down onto the solid device with an active surface of the semiconductor chip opposed to the solid device.

10 13. A semiconductor device as claimed in claim 10, in which the solid device includes a substrate.

15 14. A semiconductor device as claimed in claim 13, in which the semiconductor chip is bonded face-down onto the substrate with an active surface of the semiconductor chip opposed to the substrate.

SUB A₅ >
15. A semiconductor device as claimed in claim 13 or 14, in which the substrate is provided with through holes enabling the electrical connection from a back side of the substrate to base portions of the projection
20 electrodes.

16. A semiconductor device as claimed in claim 15, in which the through holes are provided right below the projection electrodes.

17. A method for manufacturing a semiconductor device,
25 comprising:

a chip bonding step of bonding a plurality of semiconductor chips face-down onto a surface of a semiconductor substrate with active surfaces of the semiconductor chips opposed to the surface of the semiconductor substrate,

an electrode forming step of forming a plurality of projection electrodes on the surface of the semiconductor substrate,

a resin sealing step of sealing, with a protective resin, the semiconductor chip and the exposed surface of the semiconductor substrate after forming the projection electrodes in such a manner that head portions of the projection electrodes are exposed, and

a cutting out step of taking out individual pieces of chip-on-chip type semiconductor devices by cutting the semiconductor substrate along predetermined cutting lines.

18. A method for manufacturing a semiconductor device as claimed in claim 17, in which the resin sealing step includes an electrode exposing step of exposing the head portions of the projection electrodes by removing a surface layer section of the protective resin.

19. A method for manufacturing a semiconductor device as claimed in claim 18, in which the electrode exposing step includes a chip grinding step of simultaneously

polishing or grinding the protective resin and an inactive surface side of the semiconductor chip.

SUB A 6 >
5 20. A method for manufacturing a semiconductor device as claimed in any of claims 17 to 19, in which a back side of the semiconductor substrate or an inactive surface side of the semiconductor chip is polished or ground before the cutting out step.

10 21. A method for manufacturing a semiconductor device as claimed in any of claims 17 to 20, in which the projection electrodes are formed to be higher than the active surface of the semiconductor chip and lower than an inactive surface of the semiconductor chip.

22. A method for manufacturing a semiconductor device, comprising:

15 a chip bonding step of bonding a semiconductor chip face-down onto a surface of a substrate with an active surface thereof opposed to the surface of the substrate,

20 an electrode forming step of forming projection electrodes on the surface of the substrate so as to be protruded from the surface of the substrate, and

a resin sealing step of sealing, with a protective resin, the semiconductor chip and the projection electrodes in such a manner that head portions of the
25 projection electrodes are exposed.

23. A method for manufacturing a semiconductor device as claimed in claim 22, in which

a plurality of semiconductor chips are bonded onto the substrate in the chip bonding step, and

5 a plurality of groups of projection electrodes corresponding to the plurality of semiconductor chips are formed in the electrode forming step,

the method further comprising a cutting out step of taking out individual pieces of semiconductor devices
10 by cutting the substrate along predetermined cutting lines.

SUB A
24. A method for manufacturing a semiconductor device as claimed in claim 22 or 23, further comprising a step of forming through holes enabling an electrical
15 connection from a back side of the substrate to base portions of the projection electrodes.

25. A method for manufacturing a semiconductor device as claimed in any of claims 22 to 24, in which the resin sealing step includes a step of sealing, with a protective
20 resin, the projection electrodes and the semiconductor chip and a step of removing a surface layer section of the protective resin so as to expose the head portions of the projection electrodes.